

AGRICULTURAL LAND-USE CHANGES IN MODERN SUBARCTIC EUROPE: ADAPTATIONS IN THE SÁMI VILLAGE OF MÁZE, SÁPMI (NORWAY)

With 3 figures, 2 tables and 2 photos

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Zusammenfassung: Landnutzungswandel in der heutigen Subarktis Europas: Veränderungen in der samischen Siedlung Máze, Sápmi (Norwegen)

In der vorliegenden Fallstudie – die samische Siedlung Máze im norwegischen Finnmarken – werden die Wechselwirkungen zwischen abiotischen und biotischen Gegebenheiten bei der Veränderung der landwirtschaftlichen Nutzung am Rande der Ökumene Europas zwischen den Jahren 1960 und 2000 behandelt. Die wichtigsten Aspekte der jüngeren sozio-ökonomischen Veränderungen werden angesprochen, die von den subarktischen Umwelteinflüssen abhängen. Die Entwicklung der Siedlung basiert ursprünglich auf Rentierwirtschaft und wird seit Ende des 19. Jahrhunderts durch staatlich geförderte Landwirtschaft ergänzt.

Die Untersuchung der Fallstudie fußt auf großmaßstäbigen Kartierungen in den Jahren 1964 und 2000 sowie auf lokalen Erhebungen und öffentlichen Statistiken. Für das Siedlungs- und Nutzungsgebiet von Máze werden Bevölkerungsentwicklung, Gebäudesubstanz und -nutzung (Häuser, Hütten, Infrastruktur) und besonders die Hofstellen mit landwirtschaftlicher Produktion vorgestellt und analysiert. Außerdem wird die Veränderung der wirtschaftlichen und sozialen Situation der Siedlung interpretiert, die von der samischen Bevölkerung kulturell geprägt ist. Die gezeigten Veränderungen sind Folge der isolierten Lage und der schwierigen klimatischen Bedingungen sowie dem von politischer Seite behinderten Siedlungsausbau in den 70er Jahren.

Summary: The article discusses the environmental and human factors in the changes of agricultural land-use patterns and practices in a small Sámi river settlement, Máze (Norway) between 1960 and 2000. Aspects of socio-economic changes and developments are discussed. First, the environmental conditions in the European subarctic are outlined, after which the historical emergence of an economically mixed community with reliance on locally based reindeer herding and introduced agricultural hay-dairy economy is analysed. The research method to study the development of Máze land-use relied on intensive large-small mapping surveys between 1964 and 2000 and available statistics on local conditions. The Máze riverine settlement area is presented in its changing demography, human occupancy (housing, cabins, facilities, institutions and infrastructure), and finally farm homesteads and their land-use and production. Two sample years, 1964 and 2000, are compared and changes are related to human factors identifying the intensity of human environmental interactions in a sensitive subarctic ecosystem at the northern fringe of the ecumene.

1 *Socio-economic processes in the European polar ecumene*

Human settlements at the northern polar periphery of the ecumene have faced considerable challenges for a long time to cope with and adapt to external influences. In these regions, here the subarctic areas of northernmost Europe, ecological resources are limited and scarce. Environmental conditions and socio-economic changes in human societies have had their impact on emerging land use practices which caused transformations in both the physical and cultural landscape. The subarctic settlements are dependent upon a range of factors to maintain their integrity and livelihoods. Common to all settlements is the peripheral location to the southern population centres, the related needs and demands for transportation and mobility and the pressures on food supply and security emerging through population growth and concentration (cf. DUHAIME 2002).

The Sámi village of Máze discussed here has only had, next to locally-based reindeer herding, hunting and fishing, a history of permanent agricultural settlement of some 250 years during which considerable fluctuations occurred in economic activities. These changes were due to environmental changes but they were also related to political decisions which, even after decades, have had lasting socio-economic consequences for the region's population and the utilization of locally available resources. Furthermore, more recently, changes in settlement patterns and the centralization of inhabitants in fewer places have altered the economic opportunities in northernmost Norway causing people to move away from smaller settlements. Also the long distances between smaller and larger settlements have had a negative effect, reducing the possibilities to commute between remote places and the available job markets.

The general economic conditions in the northern Nordic countries of Norway, Finland and Sweden are

quite varying because the decisive tax volume depends on the national and transnational economic policies. In Finland and Sweden the directives of the European Union have dominated since 1995, which only marginally supports and subsidizes socio-economic development in its northernmost extension. The northern European periphery in fact competes directly with other regional peripheries in the European Union. Settlements in Norway play a stronger role within the national policies for economic development, but the northern location still requires increasing financial commitments to fulfil local demands which cannot always be met. Also the many Sámi settlements with small populations such as Máze face these economic constellations, meaning that local economic activities such as reindeer herding and introduced hay-dairy agriculture are very much dependent on subsidies. Thus land-use change is not limited as such by the availability of natural resources; rather state subsidy programmemes and technological innovations are crucial to the expansions of these activities.

Under these programmes modern, capital intensive agriculture with larger farm units, but reduced labour force is successful and maintained in these isolated settlements. The ensuing changes in the landscape also need to be viewed critically, using ecological parameters which might impede the political expectations for sound sustainable development in both northern agri-

culture and locally-adapted reindeer herding. Here intensive agricultural practices such as the cultivation of meadows by specific seeding and fertilization will create a more monotonous cultural landscape and land-use restricting biodiversity. Agricultural land-use is still the strongest element locally shaping the cultural landscape of the river valley in which Máze is located although, in general, its position in the livelihood of the Sámi population has been reduced during the last few decades. Thus ethnicity and cultural dimensions are the driving forces to sustain the settlement as a viable community at the northern fringe of the ecumene in subarctic Norway (cf. HELANDER 1996).

2 Environmental conditions in the European subarctic

The settlement of Máze lies in the widened valley of the Alta River in the central parts of Sápmi, northern Norway. The village stretches over a length of 10 km on both sides of the river, which flows north into the Alta Fjord at the Arctic Ocean (Fig. 1). The main settlement with its centre is situated on the western side of the valley with some residences on the eastern shore. The surrounding highlands, the Finnmarksvidda, are part of the Precambrian Fennoscandian Shield which, next to schist formations, shape the physiography of the riverine landscape (Fig. 2). Furthermore, periglacial

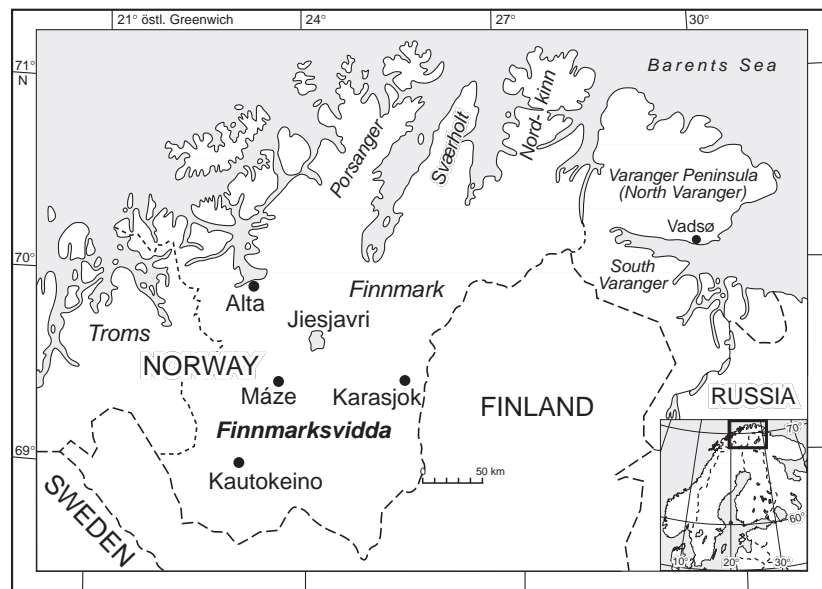


Fig. 1: Máze: location in northernmost Fennoscandia

Máze: Lage im nördlichen Fennoscandia

processes formed a hilly fell landscape with roches moutonnées and typical glacial moraines shaped by fluvial and eolian activities.

Máze is located in the overlapping zones of maritime and continental climate systems with a preponderance of the latter, as indicated by 200 days with temperatures

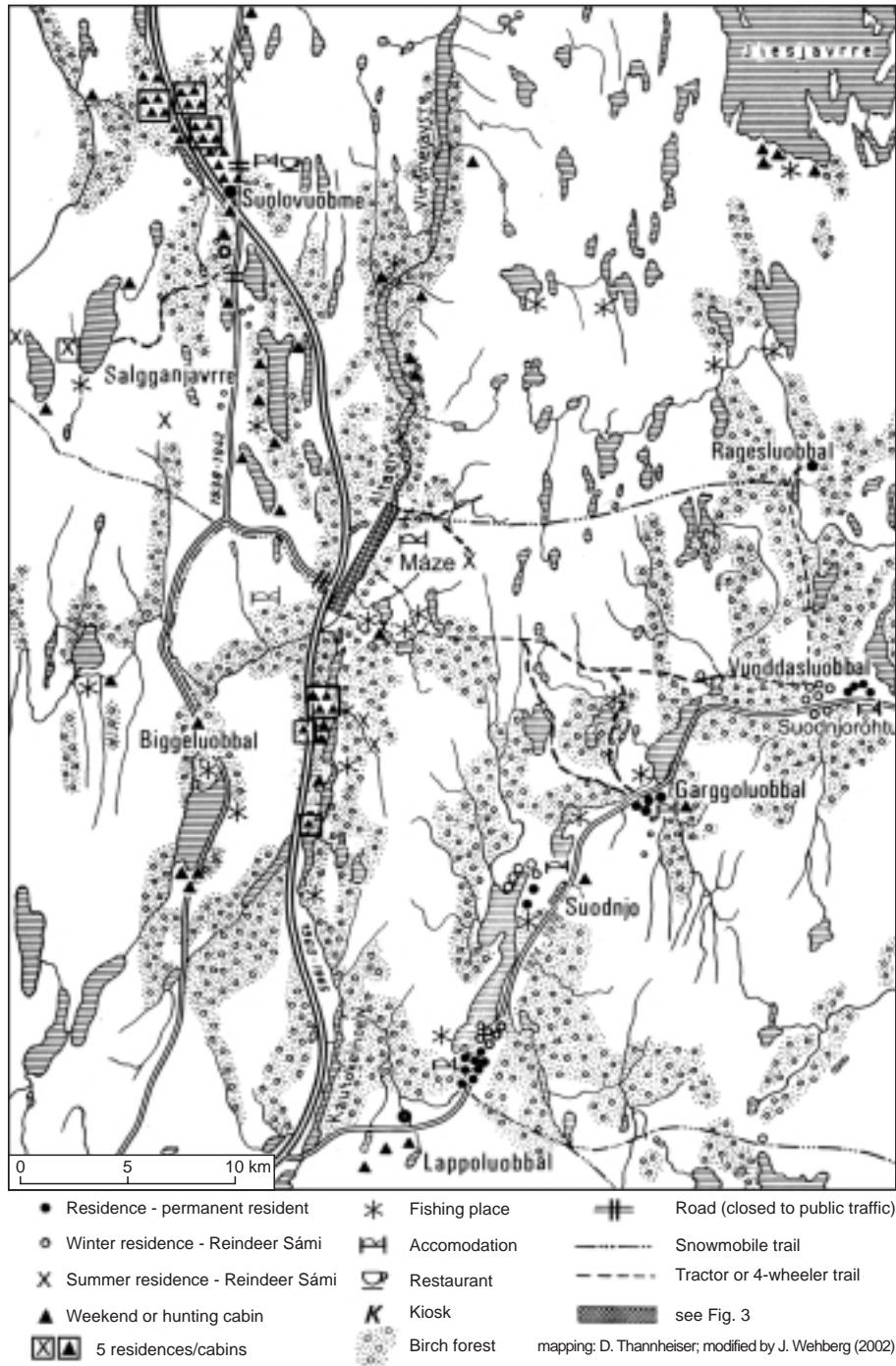


Fig. 2: Vegetation cover and infrastructure of Máze Region
Vegetationsbedeckung und Infrastruktur in der Máze-Region

below zero degree cent. annually; thus winter is the dominant season. Accordingly, the growth period is restricted to between 60 and 105 days. The snows melt in May and rapidly rising temperatures create an explosive vegetational growth. Precipitation is mainly between June and October, i.e. 261 mm of the annual average of 460 mm. Located at 69° 24' N there are more than 70 days of polar day and night each in Máze; these changing light conditions have an impact on both environment and humans. In the valley the prevalent sun angle causes large differences in the microclimate of the western and eastern slope, influencing land-use locally (cf. THANNHEISER 1975).

The vegetation of the Finnmarksvidda is influenced by its location within the subarctic ecosystem. Birch reaches its northern and altitudinal limits of spatial extension here. Depending on the geographic location, its distribution varies with the dense mountain birch forests at lower altitude giving the region its distinct landscape character. The birch vegetation is distinguished – from high to lower levels – by heath forests with lichen and berries on the fell and by meadow forests in the valleys which were predominantly cleared for agricultural lands (hay-dairy farming) in some locations. The latter forests are also mixed with willows along the river shorelines. Until the 1970s, the meadow forests were used as open or common pasture for livestock because of their richness in grass vegetation; they also provided a source of firewood. These anthropogenic influences created a specific type of meadow forest, characteristic of the region, which has now disappeared since the discontinuation of the open pasture system and a reduction in tree felling (MÜLLER-WILLE et al. 2001).

3 Historical development of Máze – a Sámi village

The Alta Valley at Máze presented optimal conditions for human occupancy because of its protected geographic location and the expansive and fertile meadows along the river banks. Related to the low population density of the Finnmarksvidda and the nomadic character of the local Sámi, the valley was mainly frequented by migrating reindeer herders as a winter settlement. These Sámi moved their herds to the coast during the summer and to the highlands from autumn to spring. With the expanding territorial interests of the Swedish Crown in northern Norway, the first non-Sámi settlers established themselves in Máze in the late 16th century; the Lutheran church with its ministers arrived in 1670. However, these first non-Sámi homesteads were abandoned after 1751 when the boundary be-

tween Denmark-Norway and Sweden was negotiated and Máze became part of the Danish-Norwegian realm. Only by 1874, induced by Norwegian governmental policies, were permanent farmsteads established and these have continued until today. They were favoured by the productive soil which allowed extensive hay-dairy farming as subsistence until World War II (HAB a. THANNHEISER 2002, 21–22). Both reindeer herding and agriculture supported this Sámi community, which carved its existence from the available renewable resources.

The village of Máze, as all other settlements in northern Norway, was deliberately and effectively destroyed by the retreating German armed forces after almost five years of occupation from 1940 to 1945. In December 1944, 21 of the 30 homesteads were burnt in Máze. After the war, due to economic recession, reconstruction began slowly and lasted into the 1960s. In Máze in 1960, there were again 25 agricultural farms with circa 100 ha of arable fields; in 1979, seven units were left and by 2000 only four units which used intensively 70% of the arable land (HAB a. THANNHEISER 2002, 36–37). Changes also occurred among the reindeer herders, who had experienced the shift from the traditional subsistence economy to the market-orientated meat industry beginning in the 1950s. Since then reindeer herding, the major local economic activity, has constantly lost professionals to other employment opportunities in the area. Still it has maintained an important position and retained its image as the defining cultural and socio-economic element of Sámi society.

A second event of great impact in the local history of Máze occurred in 1968 with the threat of the proposed flooding of all of the Alta Valley, including the settled areas. This plan was to accommodate the needs of the planned hydro-electric power development just south of Alta crowned by a 110 m high dam at the lower end of the Savtso Canyon, Europe's largest untouched canyon, 500 m in depth and 15 km in length. This proposal would have turned the river and practically all natural lakes of the Finnmarksvidda into artificial water bodies serving the hydro-power plant. Máze with 434 inhabitants including 147 reindeer herders and their families at that time would have disappeared under water (THANNHEISER a. TREUDE 1981, 138–139).

After considerable protests locally, nationally and internationally, Máze's settlement area was excluded from the flooding area (MIKKELSEN 1971); however, despite increased protests, including barricades, obstructions of objects and finally court cases (PAINE 1982; LEHTOLA 2002, 72–77), the development was built and, although at a smaller scale, was completed in 1987. In the early 21st century, it is apparent that the

expected production of electricity was not needed regionally; even government authorities agree that this project would not have been built today. Still, the built infrastructure has had a lasting imprint on the region where flooding did occur.

These socio-economic and political changes created an uncertain future for younger people in Máze who sought their fortune elsewhere and left the region for higher education and employment. This was aggravated by the fact that after 1968 the authorities discontinued issuing new construction permits or granting lots or even subsidies for renovation and expansion of either housing or agricultural facilities. The reasons given used as an excuse the continuing danger of spring flooding and the lack of supplies of treated drinking water (THANNHEISER a. TREUDE 1981).

Máze lies within the municipality of Guovdageaidnu, which was economically the second poorest municipality in Norway in 2002 (ALTAPOSTEN 2002). The municipality does not have the resources to support Máze, which is the third largest Sámi settlement in Norway after Guovdageaidnu and Kárásjohka. Although the economically more mobile people have left Máze, a large portion of the population has not moved for reasons of culture, language and identity. Both World

War II and the hydro-electric development had negative influences on Máze, including a general decrease in the population. Still, despite economic uncertainties and difficulties, the settlement was not abandoned, due to the strong cultural and social cohesiveness of the people, who are today up to 90% of Sámi descent and Sámi speaking.

Between 1960 and 1980, some increase in population occurred with people moving back and due to a higher birthrate with improved access to medical care. In 2000, the village counted 348 inhabitants, both permanent residents and wintering reindeer herders who maintain their migratory pattern and are a part of village life (STATISTIK SENTRALBYRÅ 2000). The permanent residents are mainly occupied in hay-dairy farming and the herders move their reindeer between the highlands and the coast in an established annual cycle. However, occupational diversification has also emerged in Máze with a stronger presence of the service sector, enhanced by a considerably improved infrastructure (Tab. 1). Thus the traditional occupational division is not as strong as before.

For the purposes of this article, the maps of 1964 and 2000 (Fig. 3) were compared and made compatible with each other in scale and area in order to measure the dis-

Table 1: Labour force¹ by economic sectors in Máze, 1960–1990

	1960 ²		1970 ³		1980		1990	
	n	%	n	%	n	%	n	%
Primary sector ⁴	88	66	56	0	47	29	48	31
– agriculture, forestry, fishing, trapping ⁵	88	66	56	50	47	29	48	31
Secondary sector	16	12	11	10	21	13	13	8
– mining, industry	–	–	4	4	7	4	6	4
– hydro power	–	–	–	–	–	–	–	–
– construction	16	12	7	6	14	9	7	4
Tertiary sector	27	20	40	36	91	56	95	61
– stores, hotel	5	3	12	11	15	9	16	10
– transport, communication	3	2	6	5	6	4	10	6
– bank, finance services	–	–	–	–	1	1	1	1
– public, social, private services	19	14	22	20	69	42	68	44
no data	3	2	5	4	4	2	–	–
Total labour force	134	100	112	100	163	100	156	100

Sources: NORSK SAMFUNNSVITENSKAPELIG DATATJENESTE 2001; STATISTIK SENTRALBYRÅ 1963, 1973, 1981, 1991; NORGES OFFISIELLE STATISTIKK 1999; surveys by THANNHEISER. Percentage are rounded up. ¹ labour force = working people 16 years of age and older (1960: 15 years and older). ² absolute numbers including immigrated reindeer herders and the settlement of Suolovuobme. ³ absolute numbers including the settlement of Suolovuobme. ⁴ reindeer herding is not included in the primary sector. ⁵ Máze 1960–1990, sole agriculture.

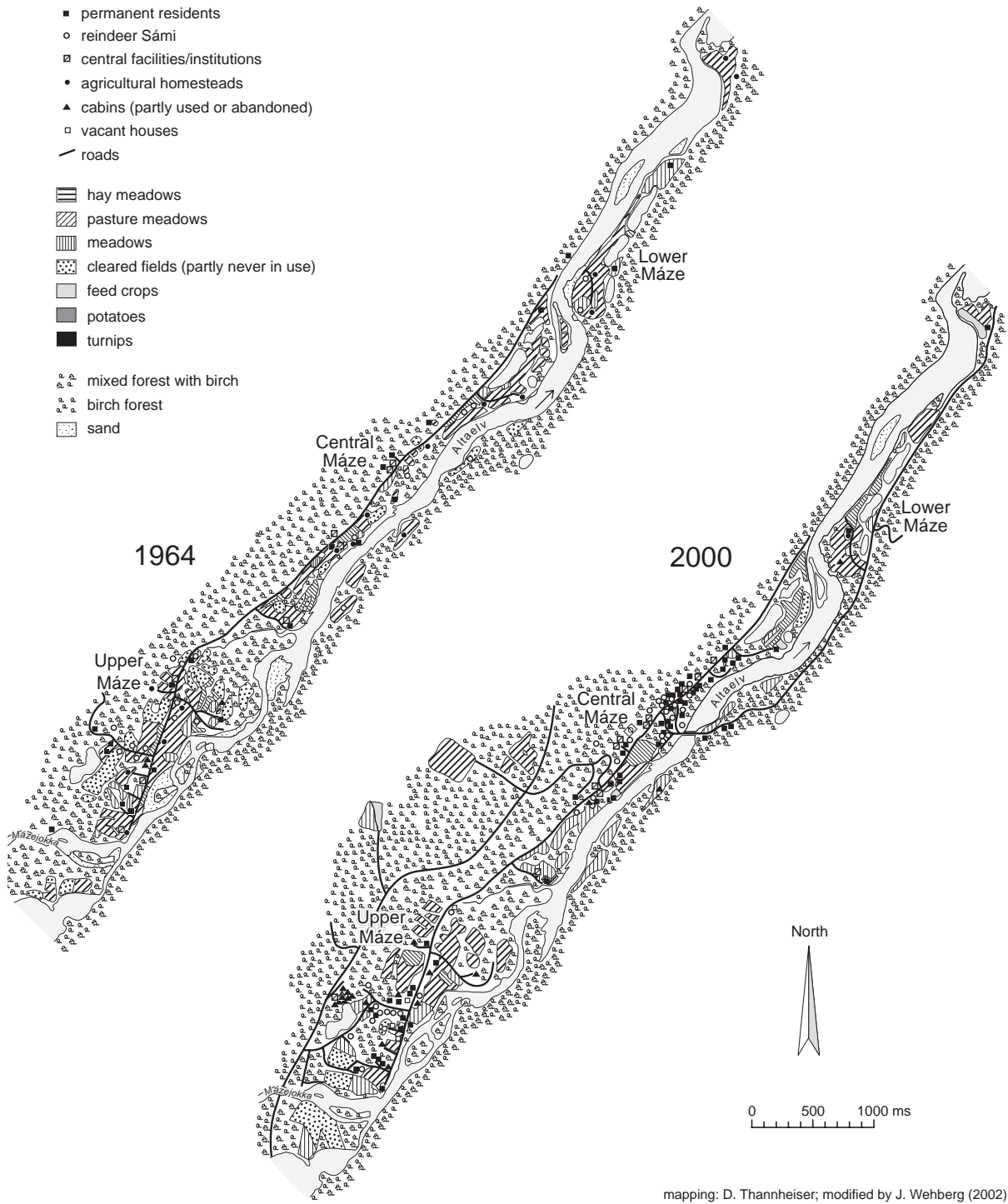


Fig. 3: Settlement and Land-Use Patterns in Máze (1964 and 2000)
 Landnutzungs- und Siedlungsformen in Máze (1964 und 2000)

tributional changes in settlement and land-use patterns for each category in size and proportion to each other. This approach allowed a detailed analysis of layers of spatial and qualitative changes which had occurred within this small, settled area over a specific period of time. The individual sample years provide unique snapshots of varying socio-economic and environmental conditions. This material thus represents a consistent picture of the emerging changes related to human and environmental factors, which were studied parallel to the surveys and placed the land-use changes at the micro-level in the broader geographical context of the Finnmarksvidda and subarctic Europe (cf. HAB a. THANNHEISER 2002; see Note).

4 Changes in land-use patterns in Máze since the 1960s

4.1 Demographic developments, 1960–2000

In 1960, Máze village had a population of 266 inhabitants which reached a peak of 444 people in 1980, an increase of 67% percent. This number had declined to 348 or by 22% in 2000 and dropped below 300 in 2002 (BYGDE- OG SMÅBRUKLAG Máze 2002) threatening the closure of the school and its transfer to Guovdageaidnu. During this 40-year period the proportion of permanent residents and winter residents, i.e. reindeer-herding Sámi, has experienced considerable variations. In 1960 there were 84 (38%) reindeer Sámi living in Máze; their absolute number increased and peaked with 176 (43%) in 1974 and then declined to 90 (26%) by 2001, a bare quarter of the population (HAB a. THANNHEISER 2002, 23).

These demographic changes are the results of events discussed above, for example, the Alta hydro-electric development, which caused turmoil and spatial conflicts for reindeer herders (PAINE 1982). Furthermore, such developments have had an impact on the cultural and socio-economic situation in the subarctic regions (cf. MÜLLER-WILLE 1978). Figures for the municipality of Guovdageaidnu show that, since the 1980s, there has been a continuous population loss, although slight in absolute numbers, due to the local economic depression with a particularly strong impact on reindeer herding, the traditional economic pursuit (HAB a. THANNHEISER 2002, 24–26). This trend is also noticed in other Sámi regions, but generally throughout northernmost Fennoscandia. The breakdown of the former Soviet Union and the bi-polar divide in the early 1990s also had a profound effect on the region (STATISTICS FINLAND 1995).

4.2 Human occupancy in Máze

4.2.1 Housing

In 1910, Máze consisted of seven permanent homesteads; their number increased to 30 in 1940. After the devastation by the Germans in late 1944 only nine houses remained. By 1950, private and public reconstruction efforts brought the number again to the level of 1940 and reached 52 residences, including the homesteads for farmers and reindeer herders, in 1960. Since then the figure has doubled to 100 units, mainly single-family residences, in 2000 (HAB a. THANNHEISER 2002, 27).

This rapid increase in housing was facilitated by the improved road network and the connection of Máze with the public electricity grid. Housing standards improved. In 1950, 5.4 people lived in one house; in 2002, with a projection of 110 housing units, the figure was 3.2 residents per unit. In 2002, all houses had been built after 1945 in Máze. In 1990, more than half of the units were not older than 30 years (HAB a. THANNHEISER 2002, 28–30). Housing is very modern and has all the amenities expected by the high living standards throughout Norway. Local housing is usually financed by a long-term low interest mortgage through public banks. With this seemingly advantageous and prosperous housing situation, up to 10% of the units were still vacant or abandoned due to their occupant's emigration or the house's poor condition.

4.2.2 Cabins

From the beginning of Máze, next to the established residences and homesteads either occupied by farmers and reindeer herders, a large number of cabins has been located within the settled area. These cabins, simple timber frame structures, are used sporadically and seasonally. They are usually located next to reindeer Sámi residences, along with sheds of necessary equipment for reindeer herding (snowmobile, motorcycle, four-wheeler, outboard motor, truck, sleds, and tools). Their use by local people has decreased over the years and most of them are now vacant or abandoned. In 2000, there were 20 such cabins, half infrequently used and half abandoned.

A different type of cabin for recreational use catering to tourists emerged some 20 years ago when a private entrepreneur built 10 such cabins close to the new highway by-pass. Although their use occurs mainly during the summer months, efforts have been made to expand the seasons to include the late winter skiing period. Fur-

thermore, in the vicinity of Máze, clusters of private cabins on leased public lands have been constructed mainly by Norwegians who live in northern urban centres such as Alta and Hammerfest. This type of land-use has had an impact on the mountain birch forests through a higher demand for firewood and an increase in infrastructure, i.e. trail, and in traffic.

4.2.3 Facilities, institutions and infrastructure

With the emergence of Máze as a centre for the Sámi on the Finnmarksvidda further public and commercial central facilities and institutions were established next to the agricultural homesteads. In 2002, these institutions included the Lutheran state church with its origin in a chapel built in 1930/31 and burned by Germans in late 1944, the school with various buildings since the early 1940s, a kindergarten since 1970, the home for the elderly since the early 1990s, a community centre and art workshop since the late 1970s, a tourist centre with cabins and restaurant at the main highway in business with interruptions since 1973, and a supermarket with post office, coffee shop, and petrol station since the mid-1960s. The buildings of discontinued services, such as the two boarding houses for pupils and the former health centre, are now used for other communal purposes (Photo 1). For some years now, an enterprise has functioned catering to tourists running boat tours to the hydro-electric power plant dam on the Alta River at Stilla (UTSI a. UTSI 2000).

Since the 1940s, Máze has been connected with other settlements, first by winter road and then, since the 1960s, by an all-season gravel highway between Alta and Guovdageaidnu that travelled over the high-lying Finnmarksvidda with a branch road into the valley. During the 1970s, a new asphalted highway was constructed through the valley by-passing the village. The main highway is connected with the 8 km long village road on the western side of the Alta River. It received an asphalt cover in 2000. A bridge was built across the river north of the village centre in 1983 linking the eastern shoreline homesteads with the western ones and the central facilities (Fig. 3).

4.2.4 Agricultural homesteads and their productivity

Since 1874, when the first permanent homestead was established, agriculture has been pursued without interruption in the Alta Valley. Until well into the 1940s, farming, plus the sale of dairy products to the wintering Sámi reindeer herding families, supported the subsistence needs of the local residents. After 1945, northern agriculture, particularly hay-dairy farming,

experienced a rapid expansion through public subsidy programmes.

Most of the agricultural lands in Máze were taken into production after 1945. Between 1949 and 1981 114.1 ha of hay and pasture meadows were cleared; and between 1954 and 1964 70% of the current agricultural area, used or unused (2001: 135 ha), was newly broken (cf. NILSEN 1982). The state subsidies enticed people to clear more land than they could feasibly put to use economically. Today, 67% of the arable land is in production in Máze; the figure for 1959 was 83% and for 1979 only 37%. Thus a considerable improvement has been achieved in the intensity of farming with a strong focus on milk production.

The number of farming units peaked with 26 in 1959 with an average of 3.2 ha in fields. By 2001, there remained only four units but with an average of 22.8 ha. The reduction in farming units since 1959 has many reasons. Some farmers turned to reindeer herding, others did not have the guarantee of generational succession, leading to an ageing of the farmers. The main reason was the impact of the hydro-electric development and the continuing threat of flooding in the valley during the 1970s. Economic development had become sluggish. Only since 2000 can an upward trend be noticed due the high concentration of labour, products, fields, investment and sharing of equipment and continuous state subsidies (HAB a. THANNHEISER 2002, 36–37).

This high concentration is also seen in the reduced diversity of livestock. In 1959, the 29 local farms held in all 22 horses, 105 beef cattle and dairy cows, 34 sheep and 24 goats. In 2000, the four farmsteads had in all 234 cattle including calves, that is about 60 livestock per unit, predominantly for milk and some meat production (Tab. 2). Increased application of chemical fer-

Table 2: Livestock in Máze, 1959–2000

Viehhaltung in Máze, 1959–2000				
Livestock	1959	1969	1979	2000
Horses	22	3	–	–
Cattle	73	59	46	117
dairy cattle	32	34	18	51
other cattle ¹	–	–	28	66
sheep	34	6	11	9
goats	21	–	–	–
pigs	–	–	–	–
chicken	–	–	–	–
rabbits	–	–	–	–

Sources: NILSEN 1982; NORGES OFFISIELLE STATISTIKK 1961–1992; STATISTISK SENTRALBYRÅ 2000; STATENS LANTBRUKSFORVALTNING 1999; surveys by THANNHEISER. ¹ other cattle: calves, heffers, bulls.

tilizers and introduction of high quality breeds and feed resulted in intense hay-dairy farming with prime production of volume per cow of 4,100 kg milk in the 1960s versus 5,900 kg in 2000. This figure is still below the average for Finnmarken at 6,200 kg. Since 1961 raw milk has been taken from Máze to Alta some 70 km north. To cope with overproduction, milk quotas were introduced in 1983, in fact capping expansion in this sector (HAB a. THANNHEISER 2002, 39–41).

It is obvious that farming in Máze is in a tenuous position socio-economically, as it is in all other agricultural areas throughout northernmost Europe. Norway's agricultural policies are still very much dedicated to subsidies to "keep people on the land". On the other hand, with Finland and Sweden as members of the European Union, its own far sweeping programme will have to adjust to the European market which does not favour northern agriculture.



*Photo 1: School center and former boarding houses, now community centre and art workshop, Máze 2002 (THANNHEISER)
Schule und frühere Unterkünfte, heute Gemeinschaftszentrum und Kunstgewerbewerkstatt, Máze 2002 (THANNHEISER)*



*Photo 2: Cattle grazing in the village, Máze 1964 (THANNHEISER)
Im Dorf weidende Rinder, Máze 1964 (THANNHEISER)*

4.3 Agricultural land-use: meadows and feed production

Agricultural lands in Máze are mainly located on the western side where the bottom of the valley is wider; there are some fields on the eastern side with limited space due to steep slopes. In the late 1980s several meadow fields were cleared on a level plateau at higher altitude west of the main highway. These agricultural fields are almost solely used for the production of feed to meet the demands of the local dairy cattle; still, large amounts of additional feed have to be imported. The total area of fields has not changed much since 1980. In 2000, there were 135 ha of arable lands of which 91 ha (67%) were under cultivation – hay and cultivated meadows for hay and silage production (85.8 ha or 94%), feed crop and potato fields (5.2 ha or 6%). The remainder consisted of fallow or abandoned meadows, 44 ha or 32% (HAB a. THANNHEISER 2002, 39). The use by cattle of open pasture or pasture meadows hardly exists any more (Photo 2); in 2002, cattle were mostly kept in barns to reduce disturbance by mosquitos between June and August and avoiding reduction in milk production. Only in September are cattle let on to the meadows (THANNHEISER a. TREUDE 1981, 142).

Feed production is almost 90% silage (timothé grass, barley, and rape) and 10% hay (in 2001 no hay was harvested). All meadows are cultivated; natural meadows are not used any more for hay production, but rather as pastures in the autumn. Some feed crops are cultivated; potatoes and vegetables (0.1 ha) are grown for home consumption. These cultivated fields are interspersed with fallow meadows which have not been used for some years and are only cut to maintain the cultural landscape evolved over some 130 years and subsidized by the State.

5 Prospects for continued livelihood in the subarctic ecumene

After more than 130 years of permanent agricultural settlement, Máze is still shaped by the presence of the reindeer herding Sámi population and thus represents today one of the stronger Sámi communities in northern Norway. Reindeer herding and agriculture have been pitched against each other, competing over space and resources. An active subsidy policy by the Norwegian government saw a rapid increase in agricultural activities and productivity from the 1940s to 1980s. However, construction of hydro-electric developments, increased infrastructure, services, and facilities in the health, service and educational sectors have altered the socio-economic opportunities of the local Sámi population since the 1980s, for both for reindeer herders, now one third of the population, and farmers. Since

then Máze has declined in population and its economic base. Agriculture now rests with only a few families and their farms which, with modern technology, attain the same amount of production as the many more farmers did before. Reindeer herding has experienced rapid changes due to technological innovations, but also changing environmental conditions, such as availability of pasture lands. Furthermore, interest in reindeer herding among the younger generation is generally decreasing; still, in Máze, younger reindeer men are very much involved in herding based on strong traditions and kinship networks. However, the fact is that Máze is located in the second poorest municipality in Norway with some 30% unemployed. There is also the threat that the local school will be closed, which would result in an increase of emigration of young families.

All these factors have had a negative impact on this riverine settlement despite improvements to the infrastructure which has been gradually modernized. The Norwegian State has created programmes intended to ameliorate the declining conditions of well-being and living standards throughout its northern territory. Both agriculture and reindeer herding have received subsidies to overcome difficult economic times. Tourism is seen as an opportunity that could maximize perceived resources such as “wilderness” and the assumed exotic aspects of Sámi culture. However, large scale tourism requires different types of facilities than exist currently in the area, and thus it does not offer solutions. Therefore it is paramount that other alternatives be found in order to cope with the living conditions in peripheral areas with low population density. This can only be done if local populations such as the Sámi are fully integrated into the decision-making process and strengthened in their position as the stewards and keepers of land.

Note: Methods and data assessment

The data analysed in this article are based on extensive long-term field research in northern Norway since the early 1960s. THANNHEISER conducted detailed vegetational studies of the Finnmarksvidda in the Máze region, residing in the village between 1963 and 1965 (THANNHEISER 1975). In 1964, he initiated the first complete mapping survey of the Máze settlement and its land-use area (map area: N-S 9.5 km, E-W 2.5 km; approximately 24 km²) in the Alta river valley and its slopes. The following categories were fully documented in a standardized way (Fig. 3).

1) Human occupancy: houses of permanent residents and reindeer herders (winter residents), central facilities, agricultural homesteads, cabins (partially used or abandoned), vacant houses, and roads.

2) Types of agricultural land-use: hay meadows, pasture meadows, fallow meadows, newly and previously cleared fields (partially overgrown by grass), fields for feed crop, potatoes/vegetables, and turnips.

3) Physical features and structures: sand deposits, birch forests, mixed birch forests, shrubs, and infrastructure (roads).

Since 1964 these surveys were repeated in the same fashion irregularly at different intervals by THANNHEISER and his associates (mainly geography students from the universities in Münster and Hamburg, Germany). The local Sámi population was always cognizant of these surveys and contributed by providing detailed information on historical events and current developments in the village. Between 2000 and 2002, both authors and their research team conducted a project focusing on the human utilization of the mountain birch forests in subarctic Europe. These studies also included Máze, where extensive interviews with local Sámi were held in addition to land-use and vegetational mapping (cf. MÜLLER-WILLE et al. 2001; AIKIO a. MÜLLER-WILLE 2002). The surveys were carried out, mainly between July and September, in 1964, 1974 and 1979 (cf. THANNHEISER a. TREUDE 1981, Fig. 3) and in 1985, 1992, 1996 and 2000 (cf. HAB a. THANNHEISER 2002, Figs. 22–24 which include all survey years).

Acknowledgments

The authors received funding for this study from the European Union, Directorate General VI – Agriculture, under the project “Human interactions with the mountain birch forest ecosystem: implications for sustainable development (HIBECO), 2000–2003” (OLK5-CT-1999-01515). Linna Weber Müller-Wille (Myriad Pursuits, St-Lambert, Québec, Canada) kindly read and edited the English manuscript. Jan Wehberg (Department of Geography, Hamburg University, Germany) digitized and adapted all the figures.

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